

Volume 6  
Number 2  
1996

NOVON

MISSOURI BOTANICAL

JUN 28 1996



GARDEN LIBRARY

New Taxa of *Fuchsia* from Central America and Mexico

Paul E. Berry

Missouri Botanical Garden, P.O. Box 299, St. Louis, Missouri 63166, U.S.A.

Dennis E. Breedlove

Department of Botany, California Academy of Sciences, Golden Gate Park, San Francisco, California 94118, U.S.A. Current address: P.O. Box 564, Bolinas, California 94924, U.S.A.

**ABSTRACT.** This paper describes and illustrates three new taxa of *Fuchsia* from Central America and Mexico. *Fuchsia paniculata* subsp. *mixensis* P. E. Berry & Breedlove is newly described in section *Schufia*; it is from a small area in central Oaxaca, Mexico, that is a geographical transition area between *F. arborescens* and *F. paniculata*. The new subspecies is distinguished by its large pubescent leaves and flowers. Because it has both hermaphrodite and female individuals, it is placed with the gynodioecious *F. paniculata* rather than the exclusively hermaphrodite *F. arborescens*. In section *Encliandra*, *Fuchsia encliandra* subsp. *microphyllodes* P. E. Berry & Breedlove is newly described from material that was previously included in *F. encliandra* subsp. *encliandra*, but differs in its more divaricating branching pattern and more serrulate leaves. *Fuchsia microphylla* subsp. *chiapensis* (Brandege) P. E. Berry & Breedlove, stat. nov., is created to recognize populations that were most recently treated as part of *F. microphylla* subsp. *aprica*. This taxon differs from subspecies *aprica* in its larger leaves, more pubescent stems and leaves, and lower elevational range.

Since the latest treatments of the Mexican and Central American species of *Fuchsia* (Breedlove, 1969; Breedlove et al., 1982), additional field and herbarium studies have led us to recognize one new taxon in section *Schufia* and two additional taxa in section *Encliandra*, all of which are described and illustrated below. Both of these sections have mem-

bers that exhibit sexual dimorphism, a trait which has evolved probably independently in several other sections of the genus. We follow the precedent of Breedlove (1969) in recognizing the new taxa at the subspecific level, implying that they have sufficient morphological, ecological, and/or geographical differences to distinguish them from other populations of the same species.

***Fuchsia paniculata* Lindley subsp. *mixensis* P. E. Berry & Breedlove, subsp. nov.** TYPE: Mexico. Oaxaca: 35 km N of Ayutla along road from Mitla to Choapam, N slope of Cerro Zempoaltepetl, 2470 m, 17 Apr. 1988, (hermaphrodite), *Breedlove & Bartholomew 66841* (holotype, CAS). Figure 1.

A *Fuchsia paniculata* Lindley subsp. *paniculata* foliis ramulisque pubescentibus, nervis secundariis 14–18-jugatis, tubo florali sepalisque roseis differt; florum hermaphroditorum magnitudine formaeque *F. arborescenti* Sims similis.

Erect shrub 2.5–4 m tall, gynodioecious; branchlets ascending, 5–30 cm long, finely pubescent with hairs 0.2–0.4 mm long. Leaves opposite, membranous, the blade elliptic, 11–25 cm long, 4–10 cm wide, puberulent on the lower surface along the veins, becoming glabrescent on the upper surface but short hairs often present along the veins, secondary veins 14–18 on either side of the midvein, apex acute to subacuminate, base acute to attenuate, margin gland-denticulate; petiole 10–25 mm long, puberulent; stipules narrowly triangular, dark



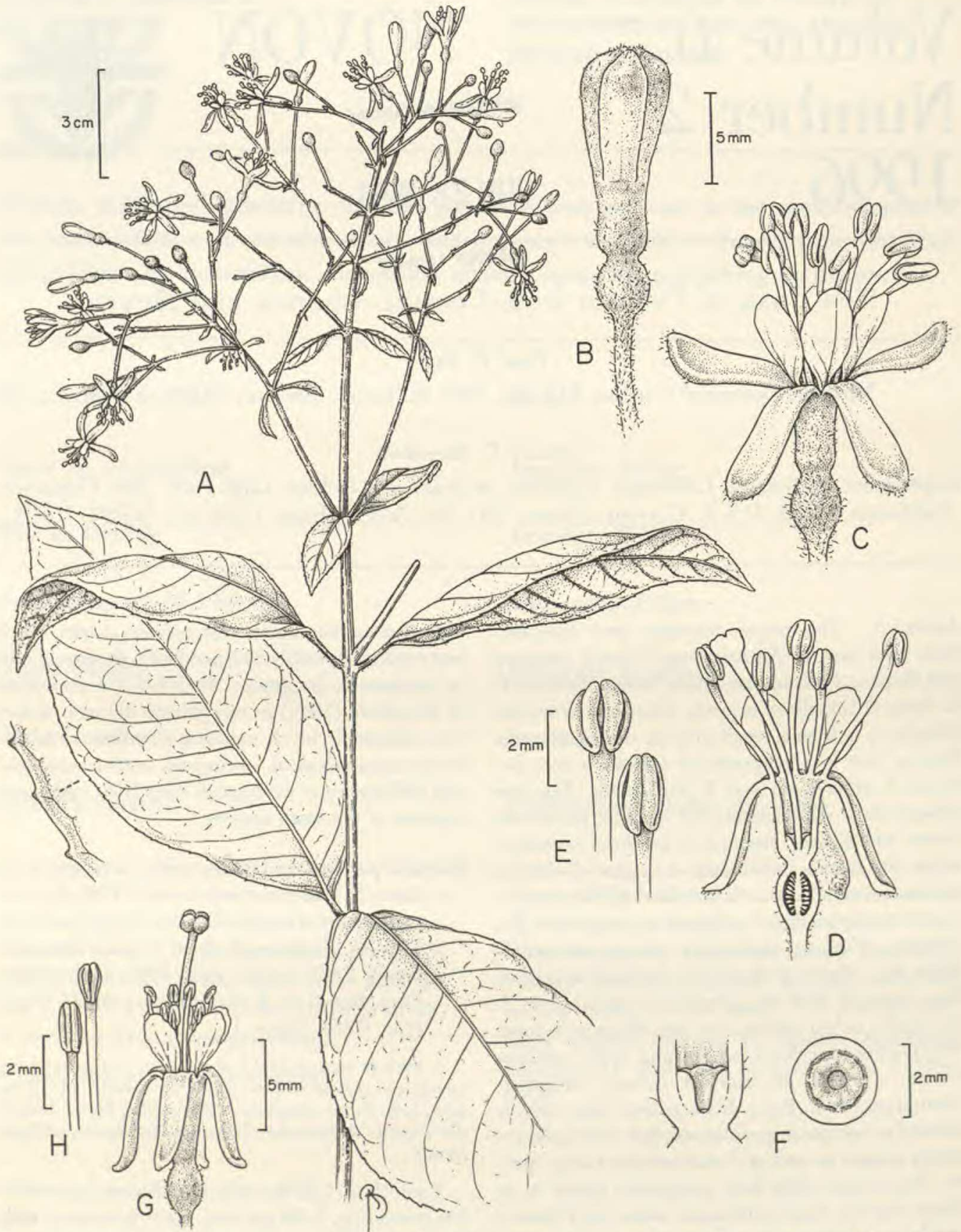


Figure 1. *Fuchsia paniculata* Lindley subsp. *mixensis* P. E. Berry & Breedlove. —A. Flowering branch, from *Martin 411* (MO). B–F. Details of bisexual flower, from individual cultivated at Strybing Arboretum. —B. Flower in bud. —C. Flower at anthesis. —D. Longitudinal section. —E. Details of fertile anthers. —F. Longitudinal section through the nectary at the base of the floral tube (left), and nectary as seen from above after the floral tube was cut off transversely. G, H. Details of female flower, from *Breedlove & Almeda 64697* (MO). —G. Flower at anthesis. —H. Details of sterile anthers.



brown, 0.3–0.7 mm wide, 1.0–1.5 mm long, crasate, soon deciduous. Flowers erect and numerous in terminal di- to trichotomously branched panicles, 10–20 cm long  $\times$  10–15 cm wide; narrowly leaflike, quickly deciduous bracteoles 1–3 mm long present at branching points of the panicle. *Perfect flowers*: Pedicels slender, 15–20 mm long, finely pubescent; ovary oblong, puberulent, 2–3 mm long; buds noticeably wider at the tip than below, 4–5 mm wide at the apex before opening; floral tube cylindrical-conical, reddish pink to magenta, sparsely puberulent to subglabrous externally, 4–5 mm long at anthesis, 2–2.5 mm wide at the rim, 1–1.5 mm wide at the base; sepals narrowly oblong, 8–10 mm long, 1.5–2.5 mm wide, soon becoming reflexed back against the floral tube, the apex acute; petals obovate, pink-lavender, 4–6 mm long, 2–4.5 mm wide; nectary 1.2–1.5 mm high, slightly lobed, adnate to the bottom of the floral tube; filaments lavender, 7–11 mm long; anthers oblong, ca. 2  $\times$  1 mm; style 14–18 mm long, exerted 10–13 mm beyond the rim of the tube; stigma capitate,  $\pm$  4-angled, 1.5–2 mm wide; fruit subglobose, 5–7 mm diam.; mature seeds not seen. *Female flowers*: Similar to the perfect ones except in the following characters: pedicels 9–14 mm long; floral tube cylindrical, 3.5–4.5 mm long, ca. 2 mm wide at the rim, 1–1.5 mm wide at the base; sepals 6–7 mm long, ca. 1.5 mm wide at the base; petals 3.5–4.5 mm long, 2–2.5 mm wide; filaments 3–4 mm long, sterile anthers oblong, ca. 1 mm long, nectary ca. 1.5 mm high; style 13–14 mm long; stigma square-capitate, with 4 noticeable lobes, 2–2.5 mm wide, exerted 8–9 mm beyond the rim of the tube.

*Ecology and distribution*. Known only from central Oaxaca, Mexico, in Distrito Mixe and Distrito de Ixtlán, in dense montane rainforest and mixed oak-conifer forest between 1700 and 2500 m elevation.

This subspecies is named after Mixe, the name of one of the districts of Oaxaca state where this taxon occurs, as well as the name of an indigenous group inhabiting the same area.

*Reyes 1165* (MO) from ca. 1900 m elevation at Totontepec in Distrito Mixe, Oaxaca, is a particularly pubescent specimen that agrees with the denticulate margins and pubescent leaves of this subspecies. Although there are only flower buds and no fully developed flowers present, it appears to be a female individual, thus supporting its placement in *Fuchsia paniculata*. Another specimen cited from the same locality, *Reyes 868* (MO), is a fairly typical individual of *F. arborescens* (except that most of the leaves are alternate or subopposite),

indicating that the two species are apparently sympatric. Whether or not *F. paniculata* subsp. *paniculata* occurs together in the same area is unknown, but it should be searched for.

*Fuchsia arborescens* reaches its southernmost limit in Oaxaca, but occurs there mainly along the Pacific slopes of the Sierra Madre. A few collections are known further inland, however, such as *Pringle 6242* from the Sierra de San Felipe and *Reyes 868* mentioned above. This species is entirely hermaphroditic and has glabrous, entire leaves. The shape and the size of the perfect flowers of *F. paniculata* subsp. *mixensis* are close to those of *F. arborescens*, whereas flowers of *F. paniculata* subsp. *paniculata* are smaller, narrower, and more violet in color throughout. However, the presence of female individuals in subspecies *mixensis* and the toothed leaves place it in *F. paniculata* rather than in *F. arborescens*. The fine pubescence of subspecies *mixensis* is quite unique from the other taxa in section *Schufia*, although Breedlove et al. (1982) cited several unusual pubescent individuals referable to either *F. arborescens* or *F. paniculata*, all from Oaxaca. Additional field studies in central Oaxaca should enable us to gain a better understanding of this transitional area between the two species that comprise *Fuchsia* sect. *Schufia* and whether interspecific hybridization is contributing to the presence of novel traits in populations such as those described here.

*Paratypes*. MEXICO. **Oaxaca**: Distrito de Ixtlán, Municipio de Yolox, along road between Yolox and Comaltepec at the river crossing closest to Yolox, 1700 m, 11 Mar. 1981, hermaphrodite, *Martin 411* (CAS, MO); 6.5 km E of the Mitla to Choapam road along road to Zacatepec, N slope of Cerro Zempoaltepetl, 2285 m, 26 Sep. 1986, male, *Breedlove & Almeda 64697* (CAS).

***Fuchsia microphylla* HBK subsp. *chiapensis*** (Brandeggee) P. E. Berry & Breedlove, stat. nov. *Fuchsia chiapensis* Brandeggee, Univ. Calif. Publ. Bot. 6: 59. 1914. TYPE: Mexico. Chiapas: Cerro de Boquerón, Sep. 1913, *Purpus 6707* (holotype, UC; isotypes, BM, F, GH, MO, NY, US). Figure 2.

*Fuchsia heterotricha* Lundell, Contr. Mich. Herb. 4: 19. 1940. TYPE: Mexico. Chiapas: Volcán de Tacaná, Aug. 1938, *E. Matuda 2457* (holotype, MICH; isotypes, LL, MEXU, US).

Shrub 1–2 m tall, gynodioecious; branchlets 5–15 cm long, lightly to densely strigose with tan to white hairs. Leaves opposite, membranous, the blade elliptic-ovate, 15–40(–50) mm long, 8–23(–30) mm wide, with scattered hairs on the lower surface along the veins, secondary veins 4–6 on



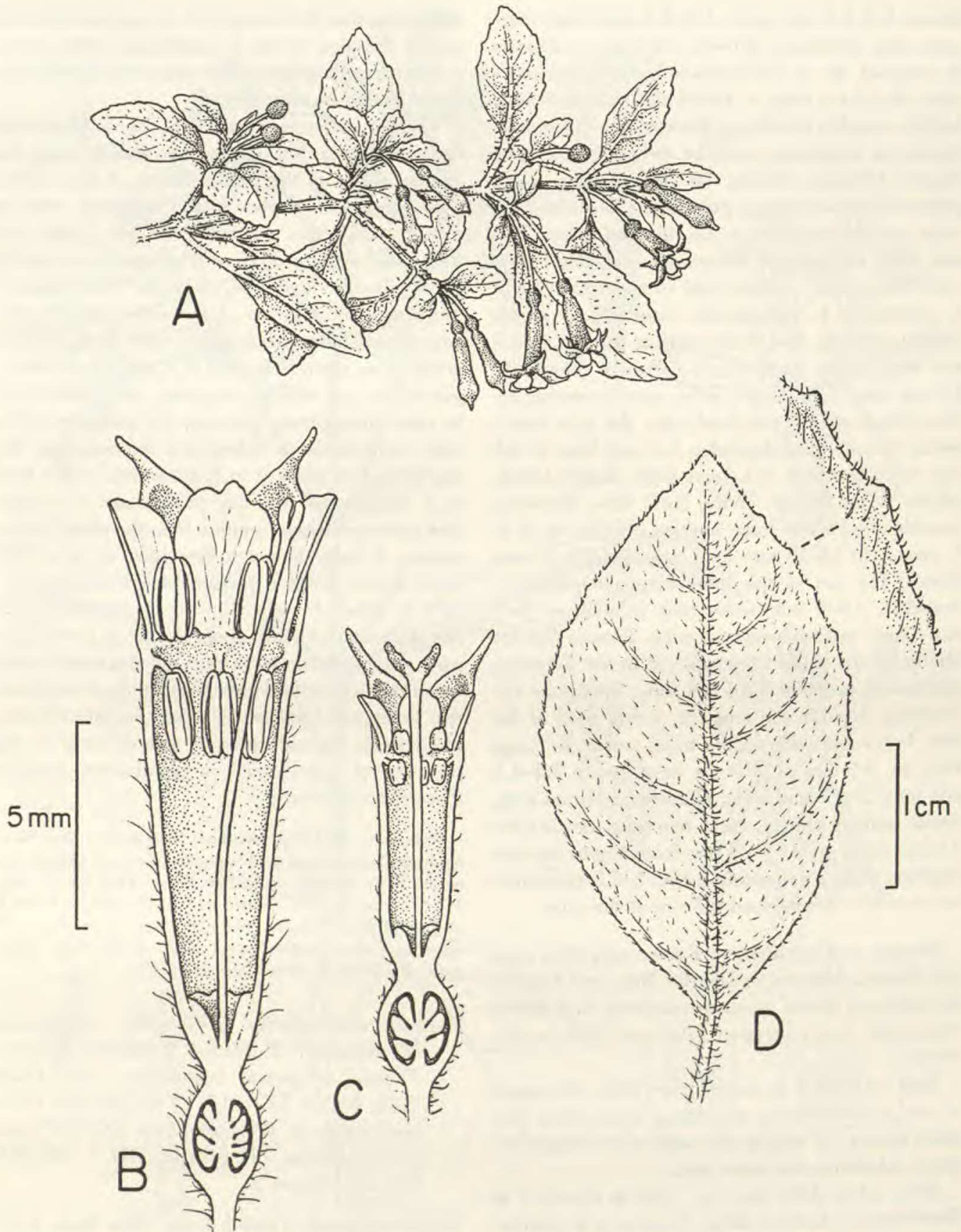


Figure 2. *Fuchsia microphylla* HBK subsp. *chiapensis* (Brandege) P. E. Berry & Breedlove. —A. Flowering branch, from *Breedlove* 42777. —B. Longitudinal section through a bisexual flower, from *Breedlove* 42357. —C. Longitudinal section through a female flower, from *Breedlove & Almeda* 64806. —D. Detail of leaf, from *Breedlove & Sigg* 66127.

either side of the midvein, apex acute, base acute to cuneate, margin subentire to dentate; petiole 8–23 mm long; stipules narrowly lanceolate, dark brown, ca. 0.5 mm wide, 0.5–1 mm long, crassate,

deciduous. *Perfect flowers*: Pedicels 5–20 mm long, strigose; ovary rounded, pubescent, 1–2 mm long; floral tube cylindrical, pubescent externally, red, 5–11 mm long, 2–4.5 mm wide at the rim, 1.5–2.5



mm wide at the base; sepals 2.5–4 mm long, 1.5–2.5 mm wide at the base, spreading, the apex sub-acuminate; petals red, 2–3 mm long, 2–4 mm wide,  $\pm$  3-lobed at the apex; nectary 0.7–1.2 mm high, entire; style 8–12 mm long, the stigma capitate, exerted 3–6 mm beyond the rim of the tube; antesealous stamens exerted above the rim of the tube, antepetalous ones included inside the floral tube; filaments 0.5–1.5 mm long; anthers 1.4–2.0 mm long, 0.7–1.0 mm thick; fruit subglobose, 5–7 mm diam., with 12–20 seeds; seeds 1.9–2.4 mm long, 1.0–1.3 mm thick. *Female flowers*: Pedicels 6–20 mm long; floral tube cylindrical-obconic, 4–6 mm long, 2–2.5 mm wide at the rim, ca. 1 mm wide at the base; sepals narrowly triangular, 3–5 mm long, 1.5–2 mm wide at the base; petals 0.7–2 mm long, 0.7–1.7 mm wide; sterile anthers oblong, 0.5–1 mm long, filaments 0.3–0.8 mm long; nectary 0.5–0.8 mm high; style 7–8 mm long, the stigma exerted 1.5–2.5 mm beyond the rim of the tube, its lobes ca. 1 mm long.

*Ecology and distribution*. In Mexico in the mountains of southwestern Chiapas (Sierra de Soconusco) and in scattered localities along the Pacific slope of Guatemala and El Salvador. This subspecies occurs in montane rainforest, evergreen cloud forest, and wet pine-oak forest at elevations between 1800 and 2400 m.

*Fuchsia microphylla* subsp. *chiapensis* was previously treated by Breedlove (1969) under *F. microphylla* subsp. *aprica*, which he considered a particularly variable taxon, but several morphological and ecological criteria support the separation of subspecies *chiapensis*. Subspecies *aprica* is a higher elevation group of populations occurring mostly between 2700 and 3400 m. The size and shape of the leaf blades also distinguishes the two taxa: ovate in subspecies *chiapensis* and mostly 3–4 cm long  $\times$  1.5–2 cm wide vs. elliptic-oblongate and mostly 1.5–2.5 cm long  $\times$  0.5–1(–1.5) cm wide in subspecies *aprica*. Perhaps most characteristic of the leaves of subspecies *aprica* is the gradually attenuate base contrasting to the mostly acute apex and the firm texture of the blade, with crenate-serrate margins. In subspecies *chiapensis*, the base is more cuneate and not so markedly different from the apex, the blade is membranous, and the margins vary from subentire to toothed. Subspecies *aprica* is usually glabrous on the flowers and leaves, whereas subspecies *chiapensis* characteristically has a pubescent floral tube externally and noticeably pubescent young stems and leaves. Fresh flowers of subspecies *aprica* are magenta, whereas those of subspecies *chiapensis* are red. Both subspecies

intergrade freely at intermediate elevations, and subspecies *aprica* replaces *chiapensis* at higher elevations on the same slopes.

*Representative specimens cited*. MEXICO. **Chiapas**: 21.5 mi. NW of Motozintla on road to Siltepec, 1.3 mi. E of El Porvenir, 1770 m, 11 Feb. 1979, *Croat* 47317 (MO); path from Talquian to Volcán Tacaná, 1800 m, 20 Oct. 1985, *Martínez et al.* 14162 (MEXU, MO); Cerro del Boquerón, June 1914, *Purpus* 7168 (MO); above El Rosario, 8 mi. S of Motozintla, 1800 m, 10 July 1977, *Croat* 40742 (MO); near Niquivil at junction with a small side ridge to Cerro Boquerón, 16 Dec. 1976, *Breedlove* 42777 (DS, MO); SW side of Cerro Mozotal, 2100 m, 23 Nov. 1981, *Breedlove & Bartholomew* 55729 (CAS, MO); ridge NE of Cerro Boquerón on road from El Rosario to Niquivil, 2255 m, 7 Nov. 1986, *Breedlove* 65736 (CAS), 29 Nov. 1986, *Breedlove & Sigg* 66128 (CAS), 66129 (CAS), 66136 (CAS); 45–50 km NE of Huixtla along road to Motozintla, 1900 m, 17 Nov. 1971, *Breedlove & Smith* 22608 (DS); NW slope of Volcán Zunil, 6–8 km S of Zunil along road to Fuentes Georgina, 2375 m, 2 Oct. 1986, *Breedlove & Almeda* 64796 (CAS), 64805 (CAS), 64806 (CAS). GUATEMALA. **Chimaltenango**: 15 km W of Patzún, 2300 m, 14 July 1977, *Croat* 41081 (MO); highway CA1 24 km NNW of turnoff to Patzún, 2480 m, 13 Feb. 1987, *Croat & Hannon* 64751 (MO). EL SALVADOR. **Santa Ana**: Cantón La Joya, 13°52'N, 89°52'W, 1750 m, 8 Nov. 1989, *Villacorta & Calderón* (LAGU, MO). **Sonsonate**: near top of Cerro Verde, 2030 m, 30 July 1977, *Croat* 42202 (MO); Laguna de las Ninfas, 13°35'N, 89°47'W, 1830 m, 3 Apr. 1991, *Villacorta & Cortez* 737 (LAGU, MO).

***Fuchsia encliandra*** Steudel subsp. ***microphyloides*** P. E. Berry & Breedlove, subsp. nov.  
TYPE: Mexico. Oaxaca: crest of ridge just N of Chicahauxtla, 2470 m, 5 Nov. 1983, (male plant), *Breedlove & Almeda* 59742 (holotype, CAS; isotype, MO). Figure 3.

A *Fuchsia encliandra* Steudel subsp. *encliandra* ramulis valde divaricatis, statura majore, foliis lanceolato-ellipticis marginibus serrulatis, floribus magenteis differt.

Shrub 1–2 m tall, dioecious; branchlets 4–18 cm long, emerging at a  $\pm$  90° angle from the main stem, subglabrous to finely appressed-pubescent with tan hairs 0.2–0.4 mm long. Leaves opposite, firmly membranous, the blade lance-elliptic, 15–40(–50) mm long, 7–15 mm wide, glabrous on both sides or sometimes with fine appressed hairs along veins or margins on lower surface, secondary veins 4–6 on either side of the midvein or sometimes inconspicuous, apex acute, base attenuate, margin subentire to serrulate, sometimes  $\pm$  revolute; petiole 4–10 mm long; stipules narrowly lanceolate, dark brown, ca. 0.3 mm wide, 0.5–0.7 mm long, deciduous. *Male flowers*: Pedicels 5–22 mm long; floral tube cylindrical, glabrous, magenta, 9–11 mm long, 2–4 mm wide at the rim, 1.5–2 mm wide at the base; sepals triangular, 3–4 mm long, 2–2.5 mm



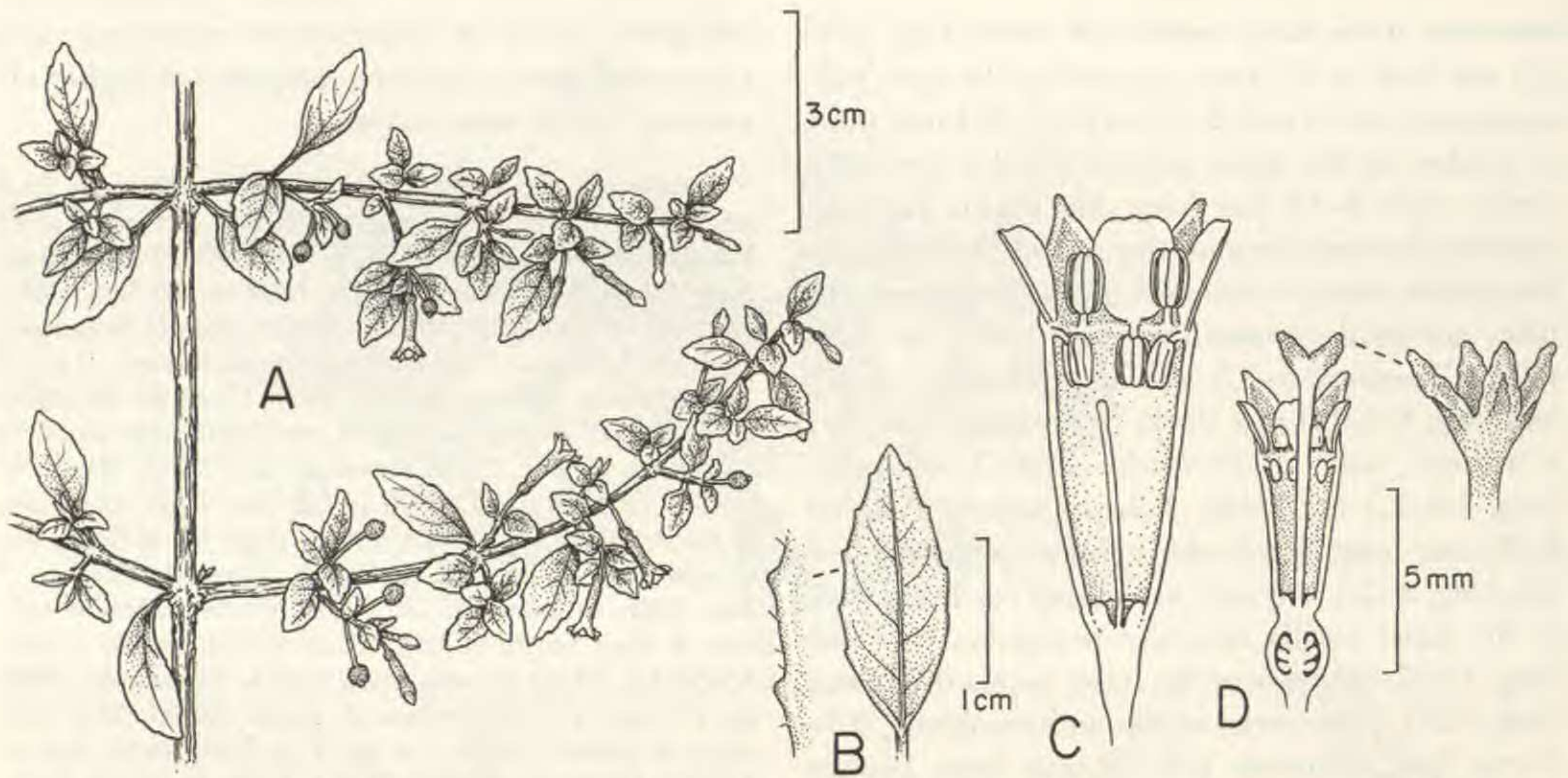


Figure 3. *Fuchsia encliandra* Steudel subsp. *microphyloides* P. E. Berry & Breedlove. —A. Flowering branch showing divaricate branchlets, from *Breedlove* 65077. —B. Detail of leaf, from *Breedlove* 59742. —C. Longitudinal section through a male flower, from *Breedlove* 59742. —D. Longitudinal section through a female flower, with detail of the stigma, from *Breedlove* 59743.

wide at the base, spreading, the apex shortly acuminate; petals magenta, subrotund, 2–3 mm long, 2–3 mm wide, slightly 3-lobed at the apex; nectary 0.9–1.1 mm high, entire; style 6–10 mm long, included within the floral tube, the stigma inconspicuous, aborted; antesealous stamens exerted above the rim of the tube, antepetalous ones included inside the floral tube; filaments 1.0–1.5 mm long; anthers oblong 1.6–2.0 mm long, 0.7–1.0 mm thick. *Female flowers*: Pedicels 4–7 mm long; ovary spherical, ca. 2 mm diam.; floral tube narrowly cylindrical, 5–7 mm long, 2–2.5 mm wide at the rim, ca. 1 mm wide at the base; sepals triangular, 2.5 mm long, 1.5–2 mm wide at the base; petals 1.3–2 mm long, 1.0–1.3 mm wide; sterile anthers oblong, 0.5–0.8 mm long, filaments 0.2–0.6 mm long; nectary 0.5–0.8 mm high; style 7–9 mm long, the stigma exerted 1.5–2.5 mm beyond the rim of the tube, its lobes ca. 1 mm long; fruit subglobose, 4–5.5 mm diam., with 12–18 seeds; seeds 1.5–2.0 mm long, 0.9–1.1 mm thick.

*Ecology and distribution.* An abundant shrub in wet pine-oak forests and in cloud forests along the crest of the Sierra Madre of Guerrero, Michoacán, and Oaxaca, in Mexico. It occurs mainly above 2000 m elevation, usually between 2200 and 2500 m, but occasionally up to 3000 m.

This subspecies is named for its strongly divaricate branching pattern, which resembles that of *Fuchsia microphylla* but is not found in the other two subspecies of *F. encliandra*. Specimens of sub-

species *microphyloides* were previously included by Breedlove (1969) under *F. encliandra* subsp. *encliandra*. However, that subspecies can be distinguished geographically, ecologically, and morphologically from subspecies *microphyloides*. Subspecies *encliandra* is locally abundant and is usually restricted to mesic sites in drier pine-oak or only pine or oak forests on the interior slopes of the Sierra Madre and in many other interior mountain ranges from Hidalgo to Oaxaca. It is a smaller shrub that rarely exceeds 1 m in height and is usually found below 2000 m elevation. In subspecies *encliandra*, the floral tube is red and the petals pink, white, or red, whereas the floral tube of subspecies *microphyloides* is magenta, as are the petals. Also, the leaves of subspecies *encliandra* are typically ovate-elliptic and entire, while those of subspecies *microphyloides* are lance-elliptic and usually serrulate.

*Paratypes.* MEXICO. **Guerrero**: W of Puerto El Gallo along road to Toro Muerto, 2530 m, 9 Oct. 1986, *Breedlove & Almeda* 65041 (CAS), 65077 (CAS); Asoleadero, ca. 15 km W of Camotla, 45 km W of Chilpancingo, 2650 m, 2 Dec. 1963, *Feddema* 2849 (MO), 2855 (MO); Sierra Madre del Sur, 15 km SW of Filo de Caballo along Milpillas-Atoyac road, ca. 3000 m, 21 May 1987, *Miller & Campos* 2845 (MO), 16 Oct. 1975, *Reveal et al.* 4209 (MO). **Michoacán**: 32 km SE of Puerto las Cruces, N of Coalcoman along road to Dos Aguas, Sierra de Coalcoman, 2195 m, 17 Sep. 1986, *Breedlove & Anderson* 64379 (CAS), 64380 (CAS). **Oaxaca**: crest of ridge just N of Chicahauxtla, 2470 m, 5 Nov. 1982, (female plant), *Breedlove & Almeda* 59743 (CAS, MO); highway 175 between Oaxaca and Po-



chutla, 5 km S of Suchixtepec, 2300 m, 19 Jan. 1979, Croat 45992 (MO); ca. 32 km N of Pochutla on highway 175, 19 Aug. 1970, Norris & Taranto 16033 (MO), 16034 (MO).

*Acknowledgments.* We kindly thank the individuals and *Fuchsia* societies who funded the illustrations for this and other forthcoming papers. The artwork was prepared by Bobbi Angell, and the Latin diagnoses were revised by Roy Gereau.

Literature Cited

- Breedlove, D. E. 1969. The systematics of *Fuchsia* section *Encliandra* (Onagraceae). Univ. Calif. Publ. Bot. 53: 1-69.
- Breedlove, D. E., P. H. Raven & P. E. Berry. 1982. The Mexican and Central American species of *Fuchsia* (Onagraceae) except for sect. *Encliandra*. Ann. Missouri Bot. Gard. 69: 209-234.